Biodegradable Nano-Bandage as a Potential Antimicrobial Agent

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Antibiotic resistance is a natural characteristic of microorganisms, but it continues to be a public health problem. With the advancement of nanotechnology, silver nanoparticles (AgNPs) have gained prominence and are being advocated in the treatment of skin wounds due to their antimicrobial properties. This study aimed to develop a biodegradable nano bandage with antimicrobial action against pathogens in skin wounds. AgNPS were obtained for green synthesis from the reduction of Ag+ ions to Ag0 by a basic dextrose solution in the presence of the aqueous extract of carqueja (Baccharis trimera). The bandage consists of malleable sodium alginate films containing AgNPs, with various formulations. The method of obtaining it was casting, and drying the film-forming solution in a BOD incubator, using a glass mold. The materials obtained were characterized by UV-Vis and Infrared spectroscopy (FTIR), Scanning Electron Microscopy, colorimetry, thickness, water mass loss, and antimicrobial activity against the microorganisms S. aureus, S. epidermidis, E. coli, P. aeruginosa, and C. albicans. The results demonstrated the obtainment of thermally resulting spherical nanoparticles, which were effectively incorporated into sodium alginate, forming malleable thin films. The minimum inhibitory concentration (MIC) results for the AgNPs dispersions demonstrated activity against all organisms tested, with the MIC of the AgNPs being lower than the commercial drug streptomycin. The minimum bactericidal concentration (CBM) data showed mortality for P. aeruginosa (0.104 ppm) and C. albicans (0.125 ppm). In conclusion, the results indicate the anticipated application of films as a promising alternative for nano-bandage with antimicrobial action.